

**Clouds and the Earth's Radiant Energy System
(CERES)**

Data Management System

**CERES Cloud Retrieval
Subsystems (4.1 - 4.3)**

**CERES Release 2 Test Plan
TRMM Launch**

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 Introduction	1
1.1 Document Overview	1
1.2 Subsystem Overview	2
1.2.1 CERES Cloud Retrieval Subsystems (4.1 - 4.3) Main Processor	2
1.2.2 CERES Cloud Retrieval Subsystems (4.1 - 4.3) Snow and Ice Preprocessor	3
1.2.3 CERES Cloud Retrieval Subsystems (4.1 - 4.3) CRH Postprocessor	3
1.2.4 CERES Cloud Retrieval Subsystems (4.1 - 4.3) QC Postprocessor	3
2.0 Test Environment	4
2.1 External Interface	4
2.2 Directory Structure and File Descriptions	4
3.0 Software and Data File Installation Procedures	5
3.1 Installation	5
3.2 Compilation	6
3.3 Miscellaneous	7
4.0 Test and Evaluation Procedures	8
4.1 Stand-alone Test Procedures	8
4.2 Normal Operating Procedures	10
4.3 Evaluation Procedures	10
4.3.1 Exit Codes	10
4.3.2 Log and Status File Results	10
4.3.3 Execution of Comparison Software	10
4.3.4 Evaluation of Comparison Software Output	11
4.3.5 Optional Evaluation Procedures	11
4.4 Solutions to Possible Problems	12
References	13
APPENDIX A Acronyms and Abbreviations	A-1
APPENDIX B Directory Structure Diagram	B-1
APPENDIX C File Description Tables	C-1

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
Figure 1-1. Subsystem 4.1 - 4.3 High-level Data Flow Diagram	3

LIST OF TABLES

<u>Table</u>	<u>Page</u>
Table 2-1. CERESlib Routines Used by Cloud Retrieval	4
Table C.1-1. Production Scripts and Executables	C-1
Table C.2-1. PCF, MCF, and SMF	C-2
Table C.3-1. Production Makefile	C-3
Table C.4-1. Ancillary Input Data (./clouds/data/ancillary/static)	C-3
Table C.5-1. Primary Input Data (./clouds/data/input)	C-4
Table C.6-1. Output Data Files (Expected)	C-4
Table C.10-1. Test Evaluation Software	C-6

1.0 Introduction

The Clouds and the Earth's Radiant Energy System (CERES) is a key component of the Earth Observing System (EOS). The CERES instruments are improved models of the Earth Radiation Budget Experiment (ERBE) scanner instruments, which operated from 1984 through 1990 on the National Aeronautics and Space Administration's (NASA) Earth Radiation Budget Satellite (ERBS) and on the National Oceanic and Atmospheric Administration's (NOAA) operational weather satellites NOAA-9 and NOAA-10. The strategy of flying instruments on Sun-synchronous, polar orbiting satellites, such as NOAA-9 and NOAA-10, simultaneously with instruments on satellites that have precessing orbits in lower inclinations, such as ERBS, was successfully developed in ERBE to reduce time sampling errors. CERES will continue that strategy by flying instruments on the polar orbiting EOS platforms simultaneously with an instrument on the Tropical Rainfall Measuring Mission (TRMM) spacecraft, which has an orbital inclination of 35 degrees. In addition, to reduce the uncertainty in data interpretation, and to improve the consistency between the cloud parameters and the radiation fields, CERES will include cloud imager data and other atmospheric parameters. The first CERES instrument is scheduled to be launched on the TRMM spacecraft in 1997. Additional CERES instruments will fly on the EOS-AM platforms, the first of which is scheduled for launch in 1998, and on the EOS-PM platforms, the first of which is scheduled for launch in 2000.

1.1 Document Overview

This document, [CERES Cloud Retrieval Subsystems \(4.1 - 4.3\) Release 2 Test Plan](#), is part of the CERES Subsystems 4.1-4.3 Release 2 delivery package provided to the Langley Distributed Active Archive Center (DAAC). It provides a description of the CERES Cloud Retrieval Release 2 software; supporting data files; and explains the procedures for installing, executing, and testing the software. A section is included on validating the results of executing the software. There are three appendices included: an Acronym List in [APPENDIX A](#), Directory Structure Diagrams are contained in [APPENDIX B](#), and a description of all the software and data files is contained in [APPENDIX C](#).

The document is organized as follows:

[Section 1.0 - Introduction](#)

[Section 2.0 - Test Environment](#)

[Section 3.0 - Software and Data File Installation Procedures](#)

[Section 4.0 - Test and Evaluation Procedures](#)

[APPENDIX A - Acronyms and Abbreviations](#)

[APPENDIX B - Directory Structure Diagrams](#)

[APPENDIX C - File Description Tables](#)

1.2 Subsystem Overview

1.2.1 CERES Cloud Retrieval Subsystems (4.1 - 4.3) Main Processor

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. This produces a set of pixel cloud properties that are mapped onto the CERES footprint in Subsystem 4.4. The major Cloud Retrieval science requirements are illustrated in [Figure 1-1](#) and include:

1. Prepare a “chunk” of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask ([Reference 1](#)).
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels ([Reference 2](#)).
3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels ([Reference 3](#)).

The primary input data sets for the Release 2 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 2 test data are Advanced Very High Resolution Radiometer (AVHRR) imager data from the NOAA-9 spacecraft.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols).
4. Clear Radiance History (CRH): The Release 2 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.

The primary output products of the Cloud Retrieval Subsystem are

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH_Update: Contains CRH values for all clear pixels in the hour
5. Status Message File (SMF) Log Files

1.2.2 CERES Cloud Retrieval Subsystems (4.1 - 4.3) Snow and Ice Preprocessor

The Snow and Ice Preprocessor reads available NSIDC Snow and Ice data sets for a given day and reprojects the data onto a 10 minute grid for use in Clouds Processing.

1.2.3 CERES Cloud Retrieval Subsystems (4.1 - 4.3) CRH Postprocessor

The CRH Postprocessor reads all available CRH_Update files for a given day and generates an updated CRH file for the next days processing.

1.2.4 CERES Cloud Retrieval Subsystems (4.1 - 4.3) QC Postprocessor

The QC Postprocessor reads all available binary QC files for a given day and generates a daily averaged binary QC file on the International Satellite Land Surface Climatology Project (ISCCP) 2.5-degree grid.

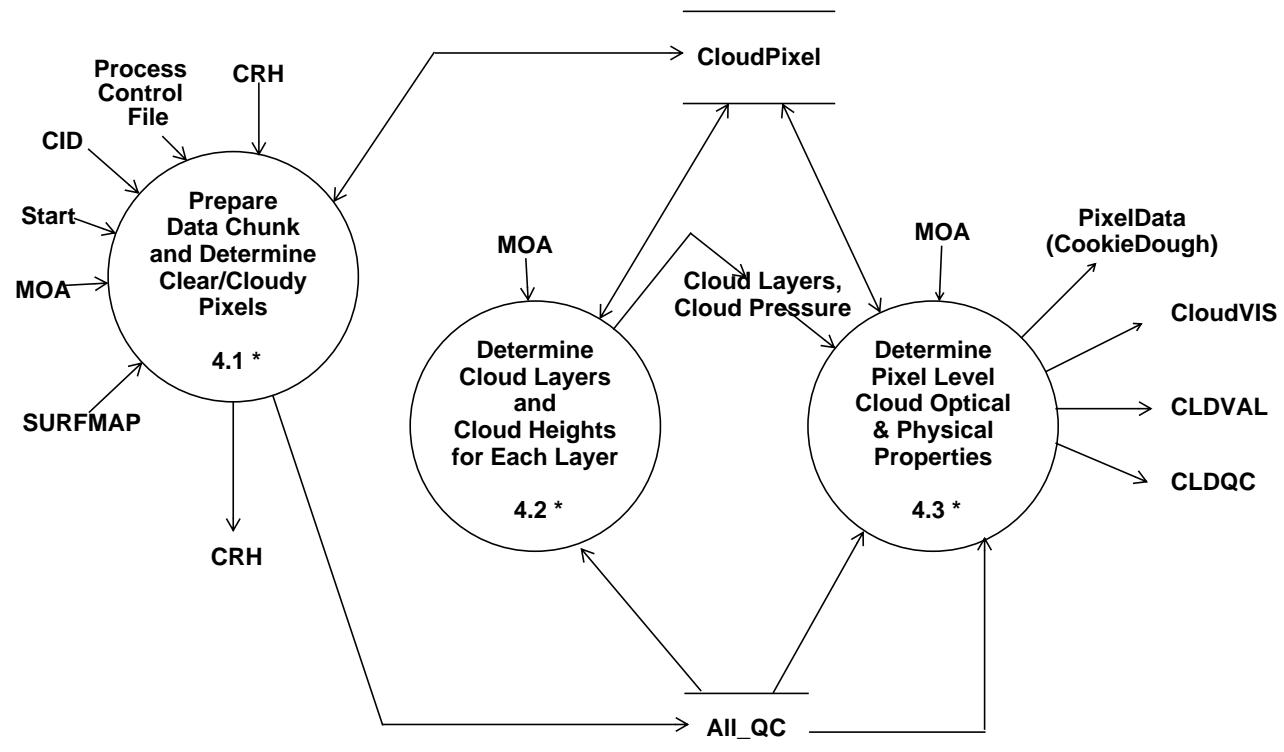


Figure 1-1. Subsystem 4.1 - 4.3 High-level Data Flow Diagram

2.0 Test Environment

2.1 External Interface

The test input data provided for Subsystems 4.1 - 4.3 are Visible and Infrared System (VIRS) data from the operational TRMM spacecraft. This delivery corrects changes made to the VIRS metadata format by the VIRS team.

The CERES Library (CERESlib) Fortran 90 modules located in libraries `cereslib.a` and `data_products.a` and used by Subsystems 4.1 - 4.3 software are listed in Table 2-1.

Table 2-1. CERESlib Routines Used by Cloud Retrieval

File Name	Description
<code>ceres_constants</code>	Provides commonly used CERES constants
<code>ceres_defaults</code>	Provides system-defined CERES default values
<code>ceres_status</code>	Provides a common set of file and return statuses
<code>ceres_time</code>	Provides commonly used time conversions
<code>f90_kind</code>	Provides F90 compiler-specific KIND values
<code>io</code>	Provides Toolkit IO wrappers
<code>msg</code>	Provides interface to the SMF Toolkit
<code>range_check</code>	Provides range checking capability for SSF data
<code>reference_grid</code>	Provides an interface to the CERES reference grid
<code>moa_io</code>	Provides an interface to the MOA data product
<code>meta_util</code>	Provides an interface to the metadata utilities

2.2 Directory Structure and File Descriptions

The CERES Cloud Retrieval Subsystems 4.1 - 4.3 Release 2 delivery package will contain three compressed software and data tar files `clouds_src_R2-042.tar.Z`, `clouds_anc_R2-042.tar.Z`, and `clouds_data_R2-042.tar.Z`. The directory structures of the untarred files are shown in [APPENDIX B](#). A description of each file included in the delivery package can be found in [APPENDIX C](#).

3.0 Software and Data File Installation Procedures

This section describes how to install the Subsystem 4.1 - 4.3 software in preparation for making the necessary test runs at the Langley DAAC. The installation procedures include instructions for uncompressed and untarring the cloud files, properly defining environment variables, and compiling the executables for 4.1 - 4.3. See the corresponding section of the Test Plan for Subsystem 4.4 for information on installation and configuration of that Subsystem.

3.1 Installation

Software/Data File Install Procedure:

1. The scripts, makefile, and Process Control File in the Subsystems 4.1 - 4.3 delivery package expect the following environment variables to be set to their corresponding locations. On the Science Computing Facility (SCF), Clouds sources the `ceres-env.csh` script in `/CERES/lib/sgi_lib` at login. Included are the definitions used at the SCF.

CERESHOME:	Home directory for CERES software /CERES
CERESLIB:	Directory for CERESlib /CERES/lib/sgi_lib
F90:	F90 Compiler (SGI) /usr/bin/f90
F90COMP:	The f90 compilation flags for modules in f90 -O -c -64
FCOMP:	The f90 compilation flags for modules in f77 -O -w -c -64
CFLAGS:	The cc compilation flags for C source code -c -O -64
HDFLIB:	The HDF Library /opt/net/TK5.2.1V1/TOOLKIT/hdf/sgi64/ HDF4.1r1/lib
HDFINC:	The location for the HDF include files /opt/net/TK5.2.1V1/TOOLKIT/hdf/sgi64/ HDF4.1r1/include
PGSDIR:	Home directory for the PGS Toolkit (5.2.1V1) /opt/net/TOOLKIT
PGSLIB:	Directory containing the physical file libPGSTK.a /opt/net/TOOLKIT/lib/sgi64
PGSMSG:	Directory for PGS Message files ~/PGS/message
PGSINC:	Directory for PGS Include files ~/PGS/include

If these environment variables are set, there should be no problems in compilation or execution of Subsystems 4.1 - 4.3.

2. Retrieve the delivery tar files and place them in the directory where the Subsystem is to be installed. The following instructions assume the directory will be \$CERESHOME.
3. From \$CERESHOME uncompress and untar the files by typing the following commands:

```
> uncompress clouds_src_R2-042.tar.Z  
> tar xf clouds_src_R2-042.tar  
> uncompress clouds_anc_R2-042.tar.Z  
> tar xf clouds_anc_R2-042.tar  
> uncompress clouds_data_R2-042.tar.Z  
> tar xf clouds_data_R2-042.tar
```

3.2 Compilation

Software Compilation Procedure:

1. It will be necessary to execute the smfcompile utility on the files **CERES_25450.t** and **CERES_25460.t**:

```
> cd $CERESHOME/clouds/smf  
> $CERESLIB/bin/smfcompile_all.csh
```

to create the required Product Generation System (PGS) include and message files for Subsystems 4.1 - 4.3.

2. Included in the delivery are two libraries which must be compiled before the main executable. The library directory was included in the delivery as part of the source tar file. To compile the library files, execute the following commands:

```
> cd $CERESHOME/clouds/lib  
> makeall install
```

3. The executables can be made by cd'ing into the source directory and typing *make*. The one makefile compiles all executables used by this Test.

```
> cd $CERESHOME/clouds/src/retrieval  
> make
```

3.3 Miscellaneous

1. In order to make this system emulate production processing, several files must be copied from their delivery location to their production location. Before executing the following commands, please make sure that the following directories exist:

```
$CERESHOME/instrument/data/int_prod  
$CERESHOME/instrument/data/ancillary/static  
$CERESHOME/sarb/data/out_comp/data/regridmoa  
  
> cp $CERESHOME/clouds/data/input/IES/CER* \  
    $CERESHOME/instrument/data/int_prod  
> cp $CERESHOME/clouds/data/ancillary/static/Eph/TRMM* \  
    $CERESHOME/instrument/data/ancillary/static  
> cp $CERESHOME/clouds/data/input/CMOA/CER* \  
    $CERESHOME/sarb/data/out_comp/data/regridmoa
```

2. The VIRS files, as received from TSDIS, are inappropriately named. Subsystems 4.1- 4.3 need the VIRS files to be named according the the following convention:
VIRS_YYYY_MN_DD_HH_MM_SS where YYYY is a four-digit year, MN is the two-digit month, DD is the two-day, HH is the two-digit hour, MM is the two-digit minute, and SS is the two-digit seconds filed. All values correspond the values from the first scanline. Included in this delivery are code and scripts to accomplish the renaming needed. Execute the following commands to link the delivered VIRS file names with the convention.

```
> cd $CERESHOME/clouds/bin  
> Run_4.1-4.0P1.RenameVIRS \  
    $CERESHOME/clouds/data/input/VIRS/1B01.971228.475.1.HDF  
> Run_4.1-4.0P1.RenameVIRS \  
    $CERESHOME/clouds/data/input/VIRS/1B01.971228.476.1.HDF
```

4.0 Test and Evaluation Procedures

This section provides general information on how to execute Subsystems 4.1 - 4.3 and 4.4. It also provides an overview of the evaluation procedures.

4.1 Stand-alone Test Procedures

Included with this test plan is all necessary data to run December 28, 1997, hour 00. The test will execute the three Product Generation Executives (PGEs) associated with Clouds Subsystem 4.1-4.4.

1. PGE4.1-4.0P1: Execute this PGE by typing the following sequence of commands:

```
> cd $CERESHOME/clouds/bin  
> CER_PCFGGen_4.1-4.0P1 4.1-4.0P1 CERES CERES \  
ValidationR1 ValidationR1 1997 12 28 00 649 00003 00042 00042  
> Run_4.1-4.0P1 \  
$CERESHOME/clouds/rcf/CER4.1-4.0P1_PCF_CERES_ValidationR1_00003.19971228
```

This will execute PGE4.1-4.0P1. In addition to the Toolkit log files in \$CERESHOME/clouds/data/runlogs, the output files of interest created by this PGE are:

In \$CERESHOME/shared_data/surfmap
CER_EICE_CERES_ValidationR1_00003.19971228, and
CER_ESNOW_CERES_ValidationR1_00003.19971228

2. PGE4.1-4.1P1: Execute this PGE By typing the Following sequence of commands:

```
> cd $CERESHOME/clouds/bin  
> CER_PCFGGen_4.1-4.1P1 4.1-4.1P1 TRMM-PFM-VIRS TRMM-PFM-VIRS \  
ValidationR1 ValidationR1 1997 12 28 00 649 00003 00042 00042  
> Run_4.1-4.1P1 \  
$CERESHOME/clouds/rcf/CER4.1-4.1P1_PCF_TRMM-PFM-VIRS_ \  
ValidationR1_00003.1997122800
```

This will execute Subsystems 4.1 - 4.3 and 4.4 sequentially. See the corresponding section of Subsystem 4.4s' Test Plan for information on the output files created by Subsystem 4.4.

In addition to the Toolkit log files, the output files of interest created by 4.1 - 4.3 are

In \$CERESHOME/clouds/data/int_prod/Cookie/
CER_IPD_TRMM-VIRS_ValidationR1_00003.1997122800 and
CER_IPD_TRMM-VIRS_ValidationR1_00003.1997122800.met
In \$CERESHOME/clouds/data/out_comp/data/CloudVis/
CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800,
CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800.dx, and
CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800.met

In \$CERESHOME/clouds/data/out_comp/data/Subset/
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11,
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11.dx,
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11.met,
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13,
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13.dx, and
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13.met

In \$CERESHOME/clouds/data/out_comp/data/CRH_Update/
CER_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800 and
CER_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800.met

In \$CERESHOME/clouds/data/out_comp/QA_Reports/
CER_EQCB_TRMM-VIRS_ValidationR1_00003.1997122800,
CER_EQCB_TRMM-VIRS_ValidationR1_00003.1997122800.met,
CER_EQCV_TRMM-VIRS_ValidationR1_00003.1997122800, and
CER_EQCV_TRMM-VIRS_ValidationR1_00003.1997122800.met

3. PGE4.1-4.2P1: Execute this PGE By typing the following sequence of commands:

```
> cd $CERESHOME/clouds/bin  
> CER_PCFGen_4.1-4.2P1 4.1-4.2P1 TRMM-PFM-VIRS TRMM-PFM-VIRS \  
ValidationR1 ValidationR1 1997 12 28 00 649 00003 00042 00042  
> Run_4.1-4.2P1 \  
$CERESHOME/clouds/rcf/CER4.1-4.2P1_PCF_TRMM-PFM-  
VIRS_ValidationR1_00003.19971228
```

This will execute PGE4.1-4.2P1. In addition to the Toolkit log files in \$CERESHOME/clouds/data/runlogs, the output files of interest created by this PGE are

In \$CERESHOME/clouds/data/out_comp/data/CRH/
CER_CRHa_TRMM-VIRS_ValidationR1_00003.19971229 and
CER_CRHa_TRMM-VIRS_ValidationR1_00003.19971229.met

In \$CERESHOME/clouds/data/out_comp/QA_Reports/
CER_EQCD_TRMM-VIRS_ValidationR1_00003.19971228

4.2 Normal Operating Procedures

Before CERES Subsystems 4.1 - 4.3 can be executed in production, input for the appropriate hour-of-data must be available from the successful execution of CERES Subsystem 12. The PGE 4.1-4.0P1 must be successfully run to produce the required Snow and Ice data sets for the given day. Imager data covering the hour to be processed, must also be available. Lastly, a Clear Radiance History (CRH) File or the default Seasonal File must be available for that day.

Please see the Test Plan for Subsystem 4.4 for its Normal Operating Requirements.

4.3 Evaluation Procedures

4.3.1 Exit Codes

As required for this release, Subsystems 4.1-4.3 meet all Langley TRMM Information System (LaTIS) Exit Codes requirements.

4.3.2 Log and Status File Results

The Error and Status Log File, Report Log File, and the User Log File will be located in directory \$CERESHOME/clouds/data/runlogs after PGEs 4.1-4.0P1, 4.1-4.1P1, and 4.1-4.2P1 have been executed.

4.3.3 Execution of Comparison Software

The evaluation software for this Subsystem will perform three sets of comparisons between the DAAC generated output and the SCF generated expected results. The first test compares the output from the Snow and Ice pre-processor. The second test compares the CRH and CRH update files. The last test compares the CloudVis and Subset CloudVis files.

1. The comparison of the Re-Projected Snow and Ice Data Sets

```
> cmp -l \
$CERESHOME/shared_data/surfmap/CER_EICE_CERES_ValidationR1_00003.19971228 \
$CERESHOME/clouds/data/out_exp/data/SnowIce/CER_EICE_CERES_ValidationR1_00003.19971228 >! \
$CERESHOME/clouds/data/out_comp/QA_Reports/DIFF_EICE_TRMM-VIRS_ValidationR1_00003.19971228
> cmp -l \
$CERESHOME/shared_data/surfmap/CER_ESNOW_CERES_ValidationR1_00003.19971228 \
$CERESHOME/clouds/data/out_exp/data/SnowIce/CER_ESNOW_CERES_ValidationR1_00003.19971228 >! \
$CERESHOME/clouds/data/out_comp/QA_Reports/DIFF_ESNOW_TRMM-VIRS_ValidationR1_00003.19971228
```

2. The comparisons of the CRH_Update and the CRH files are similar:

```
> cmp -l \
    $CERESHOME/clouds/data/out_comp/data/CRH_Update/CER_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800 \
    $CERESHOME/clouds/data/out_exp/data/CRH_Update/CER_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800 >! \
    $CERESHOME/clouds/data/out_comp/QA_Reports/DIFF_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800
> cmp -l \
    $CERESHOME/clouds/data/out_comp/data/CRH/CER_CRH_TRMM-VIRS_ValidationR1_00003.19971229 \
    $CERESHOME/clouds/data/input/ClearSky/CER_CRHSa_00003.XXXX01 >! \
    $CERESHOME/clouds/data/out_comp/QA_Reports/DIFF_CRH_TRMM-VIRS_ValidationR1_00003.19971228
```

3. Lastly are the comparisons of the CloudVis and Subset CloudVis files

```
> cmp -l
    $CERESHOME/clouds/data/out_comp/data/CloudVis/CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800 \
    $CERESHOME/clouds/data/out_exp/data/CloudVis/CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800 >! \
    $CERESHOME/clouds/data/out_comp/QA_Reports/DIFF_ECV_TRMM-VIRS_ValidationR1_00003.1997122800
> cmp -l
    $CERESHOME/clouds/data/out_comp/data/Subset/CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11 \
    $CERESHOME/clouds/data/out_exp/data/Subset/CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11 >! \
    $CERESHOME/clouds/data/out_comp/QA_Reports/DIFF_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11
> cmp -l
    $CERESHOME/clouds/data/out_comp/data/Subset/CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13 \
    $CERESHOME/clouds/data/out_exp/data/Subset/CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13 >! \
    $CERESHOME/clouds/data/out_comp/QA_Reports/DIFF_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13
```

4.3.4 Evaluation of Comparison Software Output

This section provides the procedure for evaluating the output from Subsystems 4.1 - 4.3. Please see the Subsystem 4.4 Test Plan for more information on its' Validation Plan.

1. Examine the output comparison report files by typing:

```
> cd $CERESHOME/clouds/data/out_comp/QA_Reports
> more DIFF_EICE_TRMM-VIRS_ValidationR1_00003.19971228
> more DIFF_ESNOW_TRMM-VIRS_ValidationR1_00003.19971228
> more DIFF_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800
> more DIFF_CRH_TRMM-VIRS_ValidationR1_00003.19971228
> more DIFF_ECV_TRMM-VIRS_ValidationR1_00003.1997122800
> more DIFF_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11
> more DIFF_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13
```

The DIFF_ECV.. and DIFF_ECVS.. files should have five bytes different in the headers of the file reflecting minor differences in runtime parameters. All the remaining DIFF files should be empty, indicating that the files are identical with the delivered results.

4.3.5 Optional Evaluation Procedures

None

4.4 Solutions to Possible Problems

Some output files are opened with Status = NEW in Subsystems 4.1 - 4.3. If any of these files exist when generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to rerun any of the PGEs after the initial run is made. Please contact Subsystem Lead for assistance if the Test Procedures must be rerun.

References

- 1 CERES Algorithm Theoretical Basis Document (ATBD), Volume 3, Subsystem 4.1, Reference 1.
- 2 CERES Algorithm Theoretical Basis Document (ATBD), Volume 3, Subsystem 4.2, Reference 2.
- 3 CERES Algorithm Theoretical Basis Document (ATBD), Volume 3, Subsystem 4.3, Reference 3.

APPENDIX A
Acronyms and Abbreviations

Appendix A **Acronyms and Abbreviations**

ATBD	Algorithm Theoretical Basis Document
AVHRR	Advanced Very High Resolution Radiometer
CERES	Clouds and the Earth's Radiant Energy System
CERESlib	CERES Library
CID	Cloud Imager Data
CRH	Clear Radiance History
DAAC	Distributed Active Archive Center
DAO	Data Assimilation Office
EOS	Earth Observing System
EOS-AM	EOS Morning Crossing Mission
EOS-PM	EOS Afternoon Crossing Mission
ERBE	Earth Radiation Budget Experiment
ERBS	Earth Radiation Budget Satellite
ISCCP	International Satellite Land Surface Climatology Project
LaTIS	Langley TRMM Information System
MCF	Metadata Control File
MOA	Meteorological, Ozone, and Aerosol
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
PCF	Processing Control File
PGE	Product Generation Executives
PGS	Product Generation System
QC	Quality Control
SCF	Science Computing Facility
SMF	Status Message File
SURFMAP	SURFace MAP
TRMM	Tropical Rainfall Measuring Mission
VIRS	Visible and Infrared System

APPENDIX B
Directory Structure Diagram

Appendix B

Directory Structure Diagrams

The directory structure hierarchy for the Clouds Subsystem is depicted below.

/CERES/clouds

/bin
 /lib

/src

/CloudsHDF
 /avhrr

/data

/ancillary

/dynamic
 /static

/BDM
 /Eph
 /Meta
 /Other
 /Tables
 /Vint
 /footprint

/errlogs

/input

/CMOA
 /ClearSky
 /IES
 /SnowIce
 /VIRS

/int_prod

/Cookie

/out_comp

/QA Reports

/browse

/data

/CRH
 /CRH Update
 /CloudVis
 /SSF Int
 /Subset

/data (continued)

/out exp

/QA Reports

/browse

/data

/CRH_Update

/CloudVis

/SSF_Int

/SnowIce

/Subset

/runlogs

/scr

/rcf

/smf

/src

/footprint

/retrieval

/test suites

/bin

/footprint

/retrieval

/results

/footprint

/retrieval

/src

/footprint

/SSF_Compare

/retrieval

APPENDIX C
File Description Tables

Appendix C

File Description Tables

C.1 Production Scripts and Executables

Table C.1-1. Production Scripts and Executables

File Name	Format	Description
CER_PCFGGen_4.1-4.0P1	ASCII	Script to generate 4.1-4.0P1 PCFile
CER_PCFGGen_4.1-4.0P1.IFile	ASCII	Script to generate 4.1-4.0P1 PCFile Input file
CER_PCFGGen_4.1-4.0P1.OFile	ASCII	Script to generate 4.1-4.0P1 PCFile Output file
CER_PCFGGen_4.1-4.1P1	ASCII	Script to generate 4.1-4.1P1 PCFile
CER_PCFGGen_4.1-4.1P1.IFile	ASCII	Script to generate 4.1-4.1P1 PCFile Input file
CER_PCFGGen_4.1-4.1P1.OFile	ASCII	Script to generate 4.1-4.1P1 PCFile Output file
CER_PCFGGen_4.1-4.2P1	ASCII	Script to generate 4.1-4.2P1 PCFile
CER_PCFGGen_4.1-4.2P1.IFile	ASCII	Script to generate 4.1-4.2P1 PCFile Input file
CER_PCFGGen_4.1-4.2P1.OFile	ASCII	Script to generate 4.1-4.2P1 PCFile Output file
Run_4.1-4.0P1	ASCII	Script to run 4.1-4.0P1
Run_4.1-4.0P1.RenameVIRS	ASCII	Script to run program to correctly name VIRS files.
Run_4.1-4.1P1	ASCII	Script to run 4.1-4.1P1
Run_4.1-4.1P1.ReadCV	ASCII	Script to read CloudVis files
Run_4.1-4.1P1.ReadQC	ASCII	Script to read QC Files
Run_4.1-4.1P1.WrapCV	ASCII	Script to remove temporary CloudsVis files
Run_4.1-4.1P1.footprint	ASCII	Script to run Subsystem 4.4
Run_4.1-4.1P1.retrieval	ASCII	Script to run Subsystems 4.1-4.3
Run_4.1-4.2P1	ASCII	Script to run 4.1-4.2P1
Run_4.1-6	ASCII	Script to run Subsystems 4.1-4.6
Exe_4.1-4.0P1.RenameVIRS	Binary	4.1-4.0P1 Executable for correctly naming VIRS Files.
Exe_4.1-4.0P1.SnowIce	Binary	4.1-4.0P1 Executable to pre-process Snow and Ice data
Exe_4.1-4.1P1.ReadCV	Binary	4.1-4.1P1 Executable to read CloudVis files.
Exe_4.1-4.1P1.ReadQC	Binary	4.1-4.1P1 Executable to read QC files.
Exe_4.1-4.1P1.footprint	Binary	4.1-4.1P1 Executable to execute Subsystem 4.4
Exe_4.1-4.1P1.retrieval	Binary	4.1-4.1P1 Executable to execute Subsystems 4.1-4.3
Exe_4.1-4.2P1.UpdateCRH	Binary	4.1-4.2P1 Executable to execute Update CRH
Exe_4.1-4.2P1.UpdateQC	Binary	4.1-4.2P1 Executable to generate daily QC file

C.2 Processing Control Files (PCF), Metadata Control Files (MCF), and Status Message Files (SMF)

Table C.2-1. PCF, MCF, and SMF

File Name	Format	Description
CER4.1-4.0P1_PCF_TRMM-PFM-VIRS_ValidationR1_00003.19971228	ASCII	Process Control File for combined PGE 4.1-4.0P1
CER4.1-4.1P1_PCF_TRMM-PFM-VIRS_ValidationR1_00003.1997122800	ASCII	Process Control File for combined PGE 4.1-4.1P1
CER4.1-4.2P1_PCF_TRMM-PFM-VIRS_ValidationR1_00003.19971228	ASCII	Process Control File for combined PGE 4.1-4.2P1
CECRH_AC.MCF	ASCII	MCF for CRH files
CECVS_AC.MCF	ASCII	MCF For Subset CloudVis files
CECV__AC.MCF	ASCII	MCF For CloudVis files
CEIPD_AC.MCF	ASCII	MCF For Cookiedough files
CEQCB_AC.MCF	ASCII	MCF for Binary QC files
CEQCD_AC.MCF	ASCII	MCF for Daily QC files
CEQCV_AC.MCF	ASCII	MCF for binned QC files
CFQCI_AB.MCF	ASCII	MCF for ASCII QC Report
CFQC__AB.MCF	ASCII	MCF for Binary QC Report
CFSSFIAB.MCF	ASCII	MCF File for Intermediate SSF.
CERES_25450	ASCII	Status Message File for Subsystems 4.1 - 4.3
CERES_25460	ASCII	Status Message File for Subsystems 4.1 - 4.3
PGS_25500	ASCII	Status Message File for Subsystem 4.4
surf_io_26550	ASCII	Status Message File for Subsystem 4.4

C.3 Production Makefiles

Table C.3-1. Production Makefile

File Name	Format	Description
./src/retrieval/Makefile	ASCII	Makefile for Subsystems 4.1 - 4.3
./src/footprint/Makefile	ASCII	Makefile for Subsystem 4.4

C.4 Ancillary Input Data

Table C.4-1. Ancillary Input Data (./clouds/data/ancillary/static)

File Name	Format	Description
BDM/ CER_BDIR_ErbeBDM_AVHRR_00003.epoch	Binary	ERBE Bi-Directional Model
BDM/CER_BDIR_bidrm17_AVHRR_00003.epoch	Binary	ERBE Bi-Directional Model
BDM/CER_EDIR_DModel__AVHRR_00003.epoch	Binary	ERBE Directional Model
BDM/CER_EDIR_erbedir_AVHRR_00003.epoch	ASCII	ERBE Directional Model
Tables/ CER_ICF_AVHRR_00003.epoch	ASCII	AVHRR Gac Lookup Table
Tables/ CER_ICF_HIRS__00003.epoch	binary	HIRS Lookup Table
Tables/ CER_SCF_SubRegions__AVHRR_00003.epoch	ASCII	The regions to output for CloudVis
Tables/ ER_SCF_Stowe063LUT_AVHRR_00003.epoch	Binary	Stowe Algorithm Input File
Tables/ CER_SCF_Stowe160LUT_VIRS__00003.epoch	Binary	Stowe Algorithm Input File
Tables/ CER_SCF_CERESThres__AVHRR_00003.epoch	ASCII	CERES Cloud Mask Threshold Table
Tables/ CER_SCF_ChiThrTable_AVHRR_00003.epoch	ASCII	CERES Cloud Mask Threshold Table
Tables/ CER_EIEASE_CERES_00003.epoch	Binary	Polar Coordinante Reprojection Table
Vint/bdnnref.dat	Binary	VINT Algorithm Input File
Vint/channel3.coefs	Binary	VINT Algorithm Input File
Vint/channel4.coefs	Binary	VINT Algorithm Input File
Vint/channel5.coefs	Binary	VINT Algorithm Input File
Vint/erbedir	ASCII	VINT's ERBE Directional Model
Vint/modelsnew.3.7.prod	Binary	VINT Algorithm Input File
Vint/modelsnew.prod	Binary	VINT Algorithm Input File
Vint/raybref.dat	Binary	VINT Algorithm Input File

C.5 Primary Input Data

Table C.5-1. Primary Input Data (./clouds/data/input)

File Name	Format	Description
1B01.971228.475.1.HDF	Binary	VIRS Imager Data File
1B01.971228.477.1.HDF	Binary	VIRS Imager Data File
CER_CRHSa_00003.XXXX01	Binary	CRH File for January
CER_CRHSb_00003.XXXX01	Binary	CRH File for January
CER_CRHSs_00003.XXXX01	Binary	CRH File for January
CER_CRHSt_00003.XXXX01	Binary	CRH File for January
CER_MOA_CERES_ValidationR1_000 00.1997122800	Binary	MOA Input File
NISE_SSMIF13_19971228.HDfefos	Binary	Input Snow and Ice Data Sets

C.6 Output Data Files (Expected Results)

Table C.6-1. Output Data Files (Expected) (1 of 2)

File Name	Format	Description
CER_EQCB_TRMM- VIRS_ValidationR1_00003.1997122800	Binary	Binary Hourly QC Report
CER_EQCB_TRMM- VIRS_ValidationR1_00003.1997122800.met	ASCII	Binary Hourly QC Report MCF load file
CER_EQCD_TRMM- VIRS_ValidationR1_00003.19971228	Binary	Daily Averaged QC File
CER_EQCV_TRMM- VIRS_ValidationR1_00003.1997122800	Binary	Binary Binned QC Report
CER_EQCV_TRMM- VIRS_ValidationR1_00003.1997122800.met	ASCII	Binary Binned QC Report MCF load file
CER_CRHU_TRMM- VIRS_ValidationR1_00003.19971229	Binary	Updated CRH file
CER_CRHU_TRMM- VIRS_ValidationR1_00003.19971229.met	ASCII	Updated CRH file MCF load file

Table C.6-1. Output Data Files (Expected) (2 of 2)

File Name	Format	Description
CER_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800	Binary	Update CRH hourly output file
CER_CRHU_TRMM-VIRS_ValidationR1_00003.1997122800.met	ASCII	Update CRH hourly output file MCF load file
CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800	Binary	CloudVis Visualiazation Product
CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800.met	ASCII	CloudVis Visualiazation Product MCF Load file
CER_ECV_TRMM-VIRS_ValidationR1_00003.1997122800.dx	ASCII	CloudVis Visualiazation Product DX file
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11	Binary	Subset CloudVis Visualiazation Product
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11.met	Binary	Subset CloudVis Visualiazation Product MCF load file
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R11.dx	Binary	Subset CloudVis Visualiazation Product DX file.
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13	Binary	Subset CloudVis Visualiazation Product
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13.met	Binary	Subset CloudVis Visualiazation Product MCF load file.
CER_ECVS_TRMM-VIRS_ValidationR1_00003.1997122800R13.dx	Binary	Subset CloudVis Visualiazation Product DX file
CER_EICE_CERES_ValidationR1_00003.19971228	Binary	10 Minute Ice Map
CER_ESNOW_CERES_ValidationR1_00003.19971228	Binary	10 Minute Snow Map

C.7 Output Data Files (Production Results)

Production results will be the same as specified in [Table C.6-1.](#) above.

C.8 Output Temporary Data Files

Not applicable to Subsystems 4.1 - 4.3.

C.9 Error and Status Message Files (Expected Results)

Not delivered with this package.

C.10 Test Evaluation Software

Table C.10-1. Test Evaluation Software

File Name	Format	Description
SSF_Compare	Binary	Executable program to compare expected and computed SSF_Int_19861005 output files